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Comparative Evaluation of Buckberg' and Thomas Solution on Pulmonary Haemodynamics in Dogs

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ABSTRACT

Background: Pharmacologically cardioplegia is however associated with certain inherent limitations such as a potential danger of vascular damage. The present study compared Buckberg' and Thomas solution on Pulmonary Haemodynamics in dogs. **Methods:** The present study comprised of 20 dogs. After the dogs were randomly assigned to the experimental groups, dogs were divided into 2 groups based on solution used. In group I, Buckberg' solution and in group II, Thomas solution was used. The solution was injected as per instruction. **Results:** Pulmonary artery pressure was 10.9 CMS H2O in group I and 13.09 CMS H2O in group II. The difference was non- significant (P> 0.05). **Conclusion:** Authors found no significant difference in pulmonary arterial pressure with both solutions in dogs.

Keywords: Cardioplegic solutions, Dog, Pulmonary arterial pressure.

INTRODUCTION

Pharmacologically cardioplegia is however associated with certain inherent limitations such as a potential danger of vascular damage due to app normally high concentration of different ions when in contact with normal artery and veins. For instance, potassium is extremely irritant to peripheral veins when infused in concentration which are routine during chemical cardioplegia. Hopefully, the short period of exposure of coronary arteries and veins too high cardioplegic concentration will minimise these potential effects, but long term studies in the experimental setting is needed.[1]

Histopathological studies of the heart of these patients showed that subendocardial ischaemia due to reduction in the endocardial viability ratio was probably the cause of death following such open heart bypass operations.[2] Onset of ischaemia may never get to leave operation theatre alive. Patients who could survive for longer duration had demonstrable evidence of necrosis and fibrosis in subendocardial layers of the heart. In experimental studies one is getting to understand that diseased myocardium is more susceptible to injury during operation as compared to normal syneitium. Ischaemic injury to heart muscle during.[3]

Post perfusion pulmonary congestion syndrome for pump lung is well documented clinical complication following cardiopulmonary bypass. The exact aetiopathogenesis of this syndrome is still not clear. Till date, there is no documented work in the literature to account for the immediate for long term pulmonary effects following infusion of cardioplegic solution directly into the pulmonary trunk.[4] The present study compared Buckberg' and Thomas solution on Pulmonary Haemodynamics in dogs.

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MATERIALS AND METHODS

The present study comprised of 20 dogs. The experiments were approved by the Ethical Committee. After the dogs were randomly assigned to the experimental groups, dogs were divided into 2 groups based on solution used. In group I, Buckberg' solution and in group II, Thomas solution was used. The solution was injected as per instruction.

In both groups, pulmonary Haemodynamics were measured. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

RESULTS

Table 1: Distribution of dogs

Total 20		
Groups	**Group I**	**Group II**
Solution	Buckberg' solution	Thomas solution

[Table 1] shows that in group I, Buckberg' solution and in group II, Thomas solution was used.

Table 2: Haemodynamic parameters

Parameters	Group I	Group II	P value
PAP	10.9	13.09	0.4

[Table 2 & Figure 1] shows that pulmonary artery pressure was 10.9 CMS H2O in group I and 13.09 CMS H2O in group II. The difference was non-significant (P> 0.05).

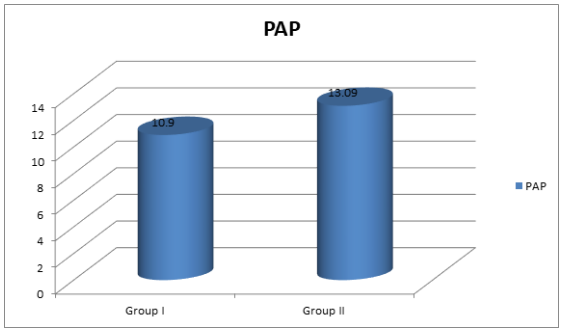

Figure 1: Haemodynamic parameters

DISCUSSION

Pulmonary arterial hypertension may be primary or due to left ventricular failure, left atrial hypertension, or pulmonary vascular obstruction, or, as in this case, lung disease, pulmonary vascular disease, or both. The diagnosis of PAH may be made easily by using color-flow and spectral Doppler, combined with 2-dimensional and M-mode echocardiography.[5] The lesions induced by PAH may include moderate-to-severe right ventricular concentric and eccentric hypertrophy, right atrial dilatation, moderate- to-severe dilatation of the main pulmonary artery and its branches, paradoxical septal motion, systolic septal flattening, reduced left ventricular internal diameter, changes in the pulmonary flow profile and velocity, and pulmonary and tricuspid valve insufficiency.[6] The present study compared Buckberg' and Thomas solution on Pulmonary Haemodynamics in dogs.

In present study, we included 20 dogs. We used Buckberg' solution which consisted of Plasmanate 850 ml, Salt poor albumin 50 ml, potassium Chloride 30 mmol/L, Glucose 50% - 40 ml, insulin 40 units and Trimethiomine 20 ml and Thomas solution which consists of magnesium chloride 6 H2O, 16 mmol, 3.553 gm, Potassium chloride 16 mmol/L, 1.93 gm and Procainhydrochloride 1 mmol/L, 0.2728 gm in distilled water 10 ml.

We found that pulmonary artery pressure was 10.9 CMS H2O in group I and 13.09 CMS H2O in group II. The difference was non- significant (P> 0.05). PAH was diagnosed on the basis of the Doppler examination findings.[7] The peak velocity of systolic tricuspid insufficiency was measured by using the continuous-wave Doppler mode. The modified Bernouilli equation provides a way for estimating pressure gradient across the tricuspid valve (systolic pressure gradient between right atrium and right ventricle).[8] Without pulmonary stenosis, the right systolic ventricular pressure is nearly equal to the systolic pulmonary pressure. The diastolic right atrial pressure is usually estimated at 5 mmHg and at 10 to 15 mmHg in patients without and with right heart failure, respectively. Systolic pulmonary arterial pressure is estimated by adding the systolic pressure gradient across the tricuspid valve to the right atrial pressure. Therefore, high-velocity tricuspid insufficiency (> 2.6 m/s) usually correlates with high right ventricular systolic pressure, and in the absence of right ventricular outflow obstruction, high-velocity tricuspid regurgitation usually indicates systolic PAH.[9]

Nevertheless, although continuous-wave Doppler gives a good estimation of systolic and diastolic pulmonary arterial pressures when the Bernoulli formula is used, cardiac catheterization is the definitive diagnostic procedure for PAH. Though catheterization is the gold standard for assessing pulmonary arterial pressure, it would have been too invasive in this case. Since pulmonary pressures were estimated by using the modified Bernouilli equation and not measured invasively, pulmonary arterial pressure may have been underestimated: the gradient method can underestimate pulmonary pressure by anything up to 20 mmHg.[10]

CONCLUSION

Authors found no significant difference in pulmonary arterial pressure with both solutions in dogs.

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